

outer portion of the wall thickness of one or more of the radially expanded and plastically deformed expandable members comprises tensile residual stresses.

[0048] According to another aspect of the present invention, a method of constructing a structure using an expandable tubular member is provided that includes strain aging the expandable member; and then radially expanding and plastically deforming the expandable member.

[0049] According to another aspect of the present invention, a method for manufacturing a tubular member used to complete a wellbore by radially expanding the tubular member at a downhole location in the wellbore comprising: forming a steel alloy comprising a concentration of carbon between approximately 0.002% and 0.08% by weight of the steel alloy.

### **Brief Description of the Drawings**

[0050] FIG. 1 is a fragmentary cross-sectional view illustrating the placement of an embodiment of an apparatus for creating a casing within a new tubular member section of a well borehole, an expansion mandrel and the injection of a fluidic material into a new tubular section of the well borehole for hydraulically moving the expansion mandrel through and thereby expanding the tubular member.

[0051] FIG. 2 is a fragmentary cross-sectional view of one alternative embodiment of a self lubricating expansion mandrel having a horizontal or circumferential groove for retaining grease, a flouropolymer, a thermo-sprayed coating, a thin self-lubricating film or another solid lubricant, according to certain aspects of the invention.

[0052] FIG. 3 is a fragmentary cross-sectional view of another alternative embodiment of a self-lubricating expansion mandrel according to certain aspects of the invention.

[0053] FIG. 4 is a fragmentary cross-sectional view of another alternative embodiment of a self-lubricating expansion mandrel according to certain aspects of the invention.

[0054] FIGS. 5A-E are examples of groove or texture patterns that may be used according to certain aspects of the present invention.

[0055] FIGS. 6A-E are examples of surface profiles that may be useful according to certain aspects of the present invention.

[0056] FIG. 7A-C is a schematic depiction a single exemplary trough or groove of a pattern or textured surface of a self-lubricating expansion mandrel subjected to a series of steps for: 7A forming the trough, 7B depositing a thin self-lubricating film, and 7C retaining the self-lubricating film in the trough for the self-lubricating expansion mandrel.

[0057] FIG. 8A-C is a schematic depiction a single exemplary trough or groove of a pattern or textured surface of a self-lubricating expansion mandrel subjected to a series of steps for: 8A forming the trough, 8B depositing a flouropolymer coating, and 8C retaining the flouropolymer coating in the trough for the self-lubricating expansion mandrel.

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